

8. Remarks on some Palearctic Bears.

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(Plates I., II.*)

[Received November 15, 1922 : Read February 20, 1923.]

Among the collections which the Royal Nat. Hist. Museum in Stockholm recently has received from China, chiefly through the courtesy of Professor J. G. Andersson, there is also material of two different kinds of Bears which are likely to arouse great interest. Therefore I take the pleasure of laying before the Society the following notes, in which I endeavour to prove that the *pruinus* Bears must be regarded as so different from other Bears that they should form a separate group of sub-generic value, and also what is to be understood by *Ursus lasiotus* Gray.

A Bear of the pruinus Group.

On the 14th of August, 1921, Mr. D. Sjölander obtained a young Bear, evidently of this group, in the Min-Shan Mountains, South-Western Kansu. With regard to its colour, it does not closely correspond with Lydekker's plate of *U. pruinus* (Proc. Zool. Soc. 1897), but there is an agreement in pattern which may be of more importance. The present specimen has the snout pale yellowish grey, with a dark brown area around and especially below the eye. Forehead and sides of head rather rich buff, but with the concealed parts of the hair blackish brown; on the occiput the colour is rather more cinnamon-rufous. The ears are richly clothed with long, shaggy fur, blackish brown in colour, and the same colour extends also over an area below them. A broad white band extends across the chest and up in front of the shoulders so as to meet dorsally and form a collar around the neck; but a branch also extends backwards across the upper part of the shoulders, so that by this and the collar, a large oval patch of blackish colour (but partly with yellowish tips) on top of the withers (interscapular region) is surrounded, except on the posterior side. From the posterior end of the posterior white branch a rather narrow yellowish-grey stripe continues downwards, and thus helps to define the black fore limb from the body. The back and flanks are black, with more or less numerous yellowish tips to the hairs. The hind limbs are black like the fore limbs. Although the colour differs in the different individuals

* For explanation of the Plates, see p. 95.

(which is a common thing among Bears), the pattern thus described may be recognized on Lydekker's plate, and on Sven Hedin's photos, published by Leche in his report on the zoological specimens collected by that explorer ('Scientific Results of a Journey in Central Asia, 1899-1902,' vol. vi. part 1, Stockholm, 1904). It will appear from this, as well as from the descriptions by various authors, that, in spite of the differences in colour which have been observed on Bears named "*pruinus*" or "*lagomyiarius*," there is a certain pattern common to all. Our knowledge about these Bears is very unsatisfactory, and it is for the present impossible to say whether they constitute more than one species or subspecies; but, nevertheless, they appear to form together a systematic unit, which differs from the common *Ursus arctos* or the genus *Ursus* s. str., to which they usually have been referred. This may be proved by the structure of the feet and the teeth, as will be shown below.

Through the investigations of Mr. R. I. Pocock, it has been proved that the Bears form several natural groups (by him considered as genera), which may be distinguished by means of the different structure of their feet. The disposition of hairiness and nakedness, and the degree in which the digital pads are free from or connected with each other, give the distinguishing characteristics.

An examination of the feet of this *pruinus* Bear gives the following results:—

The digital pads of the second, third, and fourth fingers are basally closely connected, so that there are only shallow depressions between them. The corresponding depression between the fourth and fifth fingers is somewhat broader and more pronounced, while the cleft between the second and first is still deeper. The interspaces between the digital pads are, however, in all cases completely naked. The digital pads of the fifth and, somewhat more narrowly, the first fingers, are connected by a naked area with the plantar (palmar) pad. Between the latter and the digital pads of the second, third, and fourth fingers there is a matting of rather thick and long hairs which are directed forward so as to partly cover the basal parts of the digital pads. This matting appears continuous, but a closer examination proves that it really consists of four patches, because, if the hairs are divided, there is found a hairless tract connecting each digital pad with the plantar pad, although this is concealed by the overlying hairs (cf. Pl. I. figs. 1 & 2).

The plantar pad is transverse and somewhat broader on the lateral side. In the present specimen there is only a slight crease visible, opposite the interdigital space between the second and third fingers. It is very widely separated from the carpal pad by a broad and thickly hairy area. The latter pad is rather small, somewhat elongate in shape, but not transversely expanded.

With regard to the relation between the plantar pad and the carpal pad, our *pruinus* Bear thus resembles *Euarctos*, *Ursus*,

and "*Danis*," and differs from "*Arcticonus*" (= *Selenarctos* *), *Trenarctos*, *Helarctos*, &c. The structure of the anterior portion of the fore feet of *pruinus* is, however, very different from that of *Ursus*, because the interspaces between the digital pads are hairy in the latter; in fact, the digital pads of *Ursus* are entirely surrounded by hair, because the naked strips between the digital pads and the plantar pad are so exceedingly narrow that they are even difficult to find when one is looking for them; still less are they plainly visible like those between the digital pads of the first and fifth fingers on one hand and the plantar pad on the other, as is described above, in the case of *pruinus*. With regard to this latter detail, the anterior portion of the fore feet somewhat resembles the corresponding parts of *thibetanus* (as figured by Pocock, 1914), but the digital pads of the latter are much more distinct and free from each other than in the *pruinus*.

The structure of the fore feet of *Euarctos* is essentially similar to that of *Ursus* (at least in a specimen of the Alaska race which I have had for comparison), and it differs thus in the same way from *pruinus*. The fore feet of the Grizzly Bears appear, to judge from Pocock's description, to differ from those of *Ursus* in having the digital pads more connected with each other and without hair between them, in which respect they resemble those of *pruinus*. In Pocock's figure (1918) of the "right fore foot of *Danis horribilis*" there are not to be seen any naked tracts connecting the first and fifth digital pads with the plantar pad, which is so characteristic for the fore feet of the *pruinus*. The latter appears thus to differ from "*Danis*" as well as from the other Bears with regard to the structure of its fore feet.

The digital pads of the hind feet of our *pruinus* are quite fused together basally, although the notch between the first and second toe is deeper than the others. They are not at all separated from each other by hairy tracts. The first and fifth digital pads are broadly connected with the plantar pad by means of a naked area (in the same manner as on the fore feet). Between the three middle toes and the plantar pad is a transverse area thickly covered with hair. If these hairs are divided with the aid of a pair of pincers, there is, however, to be seen a naked strip of skin connecting also these digital pads with the plantar one, although this is not visible without such a proceeding (cf. Pl. I. figs. 3 & 4). The plantar surface is naked to the heel, and there is no notch or depression covered with hair on the hallucal side, only a slight superficial crease indicating the limit between plantar and heel pads. In the absence of this hairy depression on the hallucal side, the hind foot of the *pruinus* differs from *Ursus* and *Euarctos*. Both these genera are also different from *pruinus* in having the

* Sowerby has drawn attention to the fact that Heude already (1901) gave the name *Selenarctos* to an assemblage of Black Bears, among which also *thibetanus* is found; and Sowerby, as "first reviser" of the group, selects this one as the type for Heude's genus (cf. Journ. Mamm. 1920, pp. 216-17).

digital pads surrounded by hair and quite free, not fused basally. The hind foot of "*Davis*" appears more similar to that of *pruinus* by having at least two of the digital pads fused, and the others more closely connected than in the genera just mentioned, and without hair in the interdigital spaces, as well as with regard to the weakness of the hallucal depression and the absence of hairs in the same. The likeness between "*Davis*" and the *pruinus* group is, however, not complete, because judging from Pocock's figure (1918) it has no naked connection between the first and fifth digital pads on one side and the plantar pad on the other. Such a connection is, however, visible in the figure of the hind foot of "*Tremarctos thibetanus*," figured by the same author in 1914; and in fact this figure exhibits several features similar to those of the *pruinus*, but the hind foot of the Thibetan Bear has quite free digital pads and hair in the interdigital interspaces. The fore feet of the latter are also very different in structure when compared with those of the *pruinus* group, as they have a very large carpal pad expanded across the whole plantar surface and only separated by naked and soft skin from the plantar pad.

A comparison between the feet of *Tremarctos* and those of the *pruinus* group is scarcely needed. The fore feet of the former have entirely free digital pads entirely surrounded by hairs, so that a careful examination is needed to reveal the narrow and incomplete connections with the plantar pad. The plantar pad is broadly connected with the rather large carpal pad by means of naked skin on the ulnar side; it extends also backwards on the radial side, and is there connected with a small pad. On the hind feet of *Tremarctos* as well the digital pads are free and rather thickly surrounded by hairs, so that the connections between the digital pads and the plantar pad are entirely concealed until the hairs are artificially divided. With the feet of *Helarctos* those of the *pruinus* group have no resemblance, as the former are much less hairy, and this is, of course, still more the case with those of *Melursus*.

It is thus evident that the structure of the feet of the *pruinus* Bears differs from that of all other Bears, and most certainly from that of *Ursus* s. str. The question is then, whether this difference is also connected with some other morphological differences.

Pocock has demonstrated that the noses of different Bears are different in structure. It is very difficult to judge only from a dry skin, but it appears as if the naked tract between the rhinarium and the upper lip was broader in the present *pruinus* specimen than in, for instance, *U. arctos*, *Euarctos*, *Selenarctos*, and *Tremarctos*, but of course not so broad as in *Helarctos*. In the present specimen, dry as it is, it measures about 1 cm., and is equal in breadth to the narial septum.

As the *pruinus* Bear from Kansu is rather young, the measurements of its skull have only relative value; but, thanks to the courtesy of Professor N. Holmgren, I have been able to

measure also the skull of a very old male which was brought home from Thibet by Dr. Sven Hedin. The latter skull has the teeth extremely worn, so that their dimensions are of little value, but the other measurements are useful for comparison:—

	Old specimen from Thibet.	Young specimen from Kansu.
	mm.	mm.
Greatest length of skull	351	292
Condylbasal length	331	285
Basicranial length	311	—
Zygomatic width	217	153
Length of nasals	—	90·5
Length of palate from gnathion	169	153
Width of palate inside middle of m^2	51·5	44
Distance from <i>foramen lacrymale</i> to gnathion.	134·5	118·5
Breadth of brain-case	101	101
Interorbital breadth.....	69	63
Mastoid breadth	157·5	—
Hind margin of m^2 to front of i^1	150	147
Combined length of p^4 , m^1 , and m^2	79	83·2(84)
p^4	18·3×14	18·7×15·5
m^1	24×19	26·5×19·2
m^2	39×21	41×22·2
Combined length of p_4 - m_2	88	95
p_4	—	13·8×8·7
m_1	—	27·5×14
m_2	—	29×18·2
m_3	—	25×18·5

Bear skulls are very variable in shape, and it is thus rather difficult to say whether a certain characteristic exhibited by an individual is of any taxonomic value or not. In the *pruinus* specimen from Kansu the nasals are rather long, and their posterior ends extend much beyond the frontal processes of the maxillary. The mesial length of the nasals is also longer than the mesial frontal suture. In Swedish Bears the opposite as a rule prevails, and I believed, therefore, that this might constitute a characteristic of some importance. This is, however, not the case, because I found later that, in a young Swedish Bear from the province of Jämtland, the nasals were just as in the *pruinus* specimen, being considerably longer than the mesial frontal suture.

For the present it appears very difficult to point out any definite cranial characteristic, which in every case holds good as distinctive between the *pruinus* and *arctos* groups, except those that are derived from the teeth, or stand in connection with their development.

The teeth of the *pruinus* group are, especially the molars, very much larger than the corresponding ones of the *arctos* group (*cf.* the table above). The same is also the case with p^4 and p_4 . On m^1 of the former the cingulum is quite well marked

off, even on the inner side of the tooth and not only on the outer. On m^2 it is very strongly developed on the inner side, where it forms a distinct shelf (Pl. II. fig. 5). On the outer side it is weaker, but quite traceable. p_4 has a well-developed antero-interior cingulum cusp.

The great size of the molars is relative as well as absolute (*cf.* Pl. II. figs. 5 & 6). The greatest length of m^2 that I have ever seen when examining a considerable number of Swedish Bears is 35 mm., while the same tooth in the present specimen of the *pruinus* group measures 41 mm. The difference in breadth is still more striking, because m^2 of Swedish Bears is seldom more than about 17 mm. broad, while in the present *pruinus* specimen it even exceeds 22 mm. The combined length of p^4 , m^1 , and m^2 is in Swedish male Bears, as a rule, not more than about 70 mm. and often less, and among the skulls examined by me it was only once 73 mm.; in the young *pruinus*, however, it is as much as 83 (84) mm. The dimension in question is, in adult males of the former kind, less than the distance between m^2 and the *processus postglenoideus*, and also less than the interorbital breadth, but in the *pruinus* the former dimension is larger than the two others.

In *pruinus* the combined length of these three teeth is more than half the mastoid breadth, but in *arctos* considerably less. The superior size of the teeth of *pruinus* may be proved by still more comparative measurements, but the samples mentioned may be enough. It is, however, of interest to observe that the teeth of the *pruinus* specimen are not only absolutely and comparatively larger than those of the typical *arctos*, but also than those of the big Black Bear from Mongolia, which I consider identical with *U. lasiotus* Gray (*conf.* below), and which belongs to the *arctos* group. This holds good, although this Mongolian Bear is very much larger than *pruinus*; and if the comparison between the combined length of the three teeth mentioned and the other dimensions quoted above is repeated with regard to the Mongolian Bear, the same result is obtained as with *arctos*. By this it appears to be proved that the difference between the *pruinus* and the *arctos* groups is distinct enough in this respect.

The enormous size of the last premolar, and the molars of the lower jaw can also be seen from the table of measurements above, so that further comments on this may not be needed. The big Mongolian Bear is also as regards the teeth of the lower jaw, very much inferior to the *pruinus*.

As the above-recorded measurements prove, the combined length of p_4 , m_1 , m_2 , and m_3 is considerably greater than half the length of the palate in the adult *pruinus**; but in the Bears of the *arctos* group—the big Mongolian one (*cf.* below) included—the former measurement is even less than half the length of the palate in the adult males. In the latter the combined length of the

* The much worn teeth of the very old specimen do not give very satisfactory measurements, but the corresponding dimension of the young animal must be compared with the palatal length of the older one.

teeth mentioned is about equal to half the mastoid breadth, or perhaps hardly that, but in the *pruinus* group the former measurement is about from 56 to 60 per cent. of the latter.

In consequence of the great size of the mandibular teeth and the resulting great length of the tooth series in *pruinus*, m_3 has been pushed backward, so to speak, so that the posterior portion of the same is concealed by the *processus coronoideus* when viewed from the side. This characteristic, which also has been observed and mentioned by Leche when he described the mammals brought home from Thibet by Dr. Sven Hedin (*l. c.*), serves easily to recognize a mandible of the *pruinus* group, because in the now living Bears of the *arctos* group, m_3 is in its whole extent visible in front of the *processus coronoideus*.

Of the Grizzly Bears, I have unfortunately no material for comparison, but with regard to the skull of a fossil Cave Bear I have had the opportunity of stating that it exhibits the same relative dimensions as the recent *arctos* in the cases mentioned above. Thus the combined length of p^4 , m^1 , and m^2 is shorter than the distance between m^2 and the *processus postglenoideus*, and likewise the former dimension is shorter than the preorbital width and less than half the mastoid breadth. The combined length of p_4 , m_1 , m_2 , and m_3 of the same skull is even contained $4\frac{1}{2}$ times in the length of the palate, and is less than half the mastoid breadth.

In consequence of these facts, I am inclined to consider that the Bears of the *pruinus* group (whether it consists of only one or more species or subspecies) are so different from other Bears that they are entitled to subgeneric rank. This new subgenus I propose to call *Myllarctos*; it is characterized by its very large molariform teeth and foot structure, as described above.

URSUS LASIOTUS Gray.

A fine, big male Bear, procured in Northern Mongolia by the Swedish missionary, Mr. Larsson, and through the courtesy of Professor J. G. Andersson presented to the Stockholm Museum, must, according to my opinion, be named as above. It agrees with Gray's short description, being black with brown nose and somewhat brownish on the head in front of the ears, in consequence of such tips to the hairs. The ears agree with the specific name, being richly covered with long black hairs as well inside as outside. On the sides of the neck there is in some shades of light a faint chestnut-reddish lustre. The under-fur is well developed and dark brown. The claws blackish horn-coloured. In a mounted state the specimen stands a little more than 1 m. at the fore quarters.

Gray's name (*lasiotus*) of 1867 has by later authors been more or less discarded. Even in 1869 Selater identified Gray's Bear with *U. piscator* Pucheran, which latter name referred to a Bear from Kamtschatka. It is true that not much is known concerning Gray's *lasiotus*. It was "imported from Northern

China, and was stated to come from the interior of that country" (Sclater). There appears, however, to be little reason to believe that an animal with such a history came from Kamtschatka. On the contrary, it must be considered far more probable that it really has come from the northern or interior parts of the Chinese empire, *e. g.* from Mongolia. As it is now proved that in fact a Bear with an exterior appearance agreeing with Gray's description of *U. lasiotus* lives there, I am inclined to identify it with Gray's Bear.

It is therefore a matter of secondary importance to make out whether this big Black Bear of Mongolia and the interior of China is identical or not with the Fishing Bear of Kamtschatka. As long, however, as nothing is known about this, all kinds of guessings are unnecessary, and Gray's name *U. lasiotus* may stand for the big and Black Mongolian Bear*.

Dimensions of the skull of the Mongolian Black Bear,
Ursus lasiotus Gray.

	mm.
Greatest length	387
" width	218
Interorbital width	80
Depth of muzzle at front end of nasals	65
" " just in front of orbits.....	83
Width of muzzle across alveoles of canines	78
" palate inside m^1	48.3
" " posterior part of m^2	47
Least width of palate behind molars	44
Width of palate at the premolar diastema	60
" skull outside middle of m^1	82.5
" brain-case	106
Length of nasals mesially	117
Greatest combined breadth of nasals	37
Distance from hind margin of palate to gnathion	188
" " orbit to gnathion	147
Front of canine to back of m^2	132
Combined length of p^4 , m^1 , and m^2	75
Length of p^4	16.5
Breadth of p^4	13.3
Length of m^1	24
Breadth of m^1	17
Length of m^2	35.3
Breadth of m^2	18.5
Length of lower jaw	253
Depth of lower jaw at middle of m_3	59
Combined length of p_4 , m_1 , m_2 , and m_3	84.5
m_1	24.3 × 12.3
m_2	24.8 × 16
m_3	22.2 × 15.

* Since writing the above I have had the opportunity of seeing some Bears from the Kamtschatka Peninsula which I suppose must be regarded as *Ursus piscator* Pucheran. There has been no time for a thorough examination of the skulls, but the skins certainly look very different from the specimen which I consider to be

Mr. A. Sowerby has recently published a review of "Heude's Bears in the Sikawei Museum and on Bears of Palearctic Eastern Asia." In this paper he accepts Heude's specific name *cavifrons*, and attaches the same to a Bear of N.W. Manchuria. Sowerby himself has shot a Bear of this kind in N. Kirin, Manchuria. According to the description, the exterior of this Bear must be very similar to that of the present specimen, as it is said to be "generally black, merging into brown on the muzzle; brownish on the head:" So far there is nothing which prohibits the specific identity of this Bear with Gray's *U. lasiotus* and the present specimen.

Mr. Sowerby has also published some measurements of his Bear from Kirin, which may be compared with the corresponding ones of the present specimen as recorded in the accompanying table. The greatest length of the skull of Sowerby's Bear is recorded as 16 in., or about 405 mm., thus only 18 mm. more than the present specimen. The greatest width of the former is 9.25 in. or about 234 mm.; the interorbital width is about 88 mm. If "greatest width of cranium" is to be understood as width of brain-case, this dimension, about 108 mm., is rather similar to that of the present specimen. Some of the other measurements recorded by Sowerby are less easily understood, and some are certainly larger than those of the present specimen. This is especially the case with the length of the lower jaw. As the Bears generally are very variable, it is difficult to decide whether these two are to be regarded as belonging to the same species or not, for the negative conclusion emphasizes the fact that Sowerby refers Heude's *cavifrons* to "*Spelæus*." As characteristic of the latter he mentions "very high foreheads so that the cranial outline at this point is strongly concave." Heude's figure of the type shows also such a condition. In opposition to this our Mongolian Bear shows a cranial outline which at the forehead is nearly straight. The question then presents itself: How much value can be attributed to such a characteristic as a more or less concave or straight facial profile line? With my knowledge about our Brown Bears in Sweden, I am not inclined to overrate this characteristic, because I have found that it is very variable in them. We have, for instance, from the same tract of Southern Lapland, Bear skulls with straight profile and others with the profile just as concave as Heude's figure of *cavifrons*. This fact does not, of course, prove that the variability of the Bears of Mongolia and Manchuria in this respect is as great as in Europe, but there is always the possibility or even probability that this is the case.

The important cranial characteristic which Gray mentions as

U. lasiotus Gray. They are all much paler than the latter—brown, brownish grey or lighter,—but even if they had been black, and I am told there are also very dark or black Bears in Kamtschatka, I think that such specimens must be easily recognized by their softer and much more shaggy fur than the Mongolian Bear. Bears which I have seen on several occasions in Zoological Gardens under the name of *U. piscator* were also similar to the present Kamtschatka skins.

distinguishing the Grizzly Bears from the true *Ursus* of the *arctos* group, viz. "the palate narrow and contracted behind," is not mentioned for "*cavifrons*," and it is not known if its palate has this characteristic shape or not. If such should happen to be the case, our Mongolian Bear has nothing to do with it, because the latter has a broad palate, which is not more contracted behind the molars than is the case with true *arctos*; and it therefore certainly belongs to the same group as the latter.

Mr. Sowerby also mentions another of Heude's Bears, called by the latter "*Ursus mandchuricus*." It is also a large and dark Bear, although not so black as "*cavifrons*," and is said to have a "fairly straight cranial outline." It is possible that this is identical with Gray's *lasiotus*, and, if such is the case, the latter name of course has priority. The question about the identity can hardly be decided for the present, but so much ought to be certain, that nothing prevents Gray's name from being laid on the present big and Black Bear from Mongolia, which evidently is a member of the *arctos* group.

With regard to the general size, the Mongolian Bear appears to be larger than the European, and the greatest length of the skull of the former (387 mm.) is larger than that of any Swedish Bear skull I have seen. The three largest specimens of the latter kind that I have had the opportunity of measuring, have had maximum lengths of 362, 367, and 372 mm. With regard to the zygomatic width, the Mongolian Bear is not superior to some of the largest Swedish Bears. On one occasion I found the same breadth, viz. 218 mm., in one of the latter, but several times still greater dimensions, *e. g.* 223, 225, 229, and even 231 mm. The latter is thus similar to Sowerby's specimen in breadth. With regard to the interorbital width (80 mm. in the Mongolian Bear), I have seen several Swedish Bear skulls as large or still broader, *e. g.* 80, 83 (twice), 84. and 89 mm.—the last thus fully equal to Sowerby's specimen. Otherwise the Mongolian Bear is greater in most dimensions or near the maximum. The palate is, however, often broader in male Swedish Bears.

The comparative size of the teeth is to be seen from the following:—

p^4	in the Mongolian specimen	16.5 mm.;	in Swedish male Bears	15-16.5 (once 17.5 and once 18) mm.
m^1	„	„	24 mm.	„ „ „ 21-23 (once 20) mm.
m^2	„	„	35.3 mm.	„ „ „ 32-35 (once resp. 31, 30, and 29 mm.).

The difference in this respect is therefore not so very great. Unfortunately, Sowerby has not given any measurements of the teeth of "*cavifrons*," but Heude's figures of the teeth, which are said to represent the actual size, do not indicate that the teeth of his Bear are larger than those of an average Swedish Bear, and m^2 appears to be rather narrow.

EXPLANATION OF THE PLATES.

PLATE I.

- Fig. 1. Photograph of the lower side of the right fore foot of a *pruinus* Bear (skin) from Kansu.
- „ 2. Diagram of the lower side of the right fore foot of a *pruinus* Bear to show the distribution of the hairy areas and the connections between the digital pads and the plantar pad.
- „ 3. Photograph of the lower side of the right hind foot of a *pruinus* Bear (skin) from Kansu.
- „ 4. Diagram of the lower side of the right hind foot of a *pruinus* Bear to show the connection between the digital pads and the plantar pad.

PLATE II.

- Fig. 5. Upper jaw with dentition of a young *pruinus* Bear from Kansu.
- „ 6. Lower jaw with dentition of a young *pruinus* Bear from Kansu.